

**CLAIMS:**

1           1.       A method of selecting components for total hip arthroplasty during per-  
2           formance of an operation, comprising:

3           A.   establishing a pelvic and a femoral reference coordinate system from a single  
4           fluoroscopic image;

5           B.   determining the position of a femoral broach by means of a surgical navigatio-  
6           system;

7           C.   during the operation, using data obtained from said navigation sys-  
8           tem, selecting femoral head and neck components to satisfy defined pa-  
9           rametric constraints with respect to at least one of leg length, offset, and  
10          range of motion.

1           2.   A method of defining a femoral coordinate system, comprising the steps of:

2           A.   defining a femoral shaft axis;

3           B.   with the knee bent at approximately 90 degrees relative to the femur, defin-  
4           ing a lower leg axis;

5           C.   computing the intersection of a first plane perpendicular to the femoral shaft  
6           axis and the lower leg axis; and

7           D.   establishing a coordinate system based on said femoral shaft axis, said lower  
8           leg axis, and said intersection.

1           3.   A method according to claim 2 in which said femoral shaft axis, said lower  
2           leg axis, and said intersection themselves form the axes of said coordinate system.

1           4.   A method of determining the axial rotation of a pelvis from a single fluoro-  
2           scopic image, comprising

3           A.   forming a fluoroscopic image of said pelvis in the near AP direction;

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- 4           B. defining first and second landmarks of said pelvis on said image, said land-  
5 marks separated from each other in at least an anterior-posterior direction;
- 6           C. determining the transaxial displacement of said landmarks on said image;
- 7           D. using said displacement as a measure of the axial rotation of said pelvis with  
8 respect to the plane of said fluoroscopic image.
- 1           5. A method according to claim 4 in which said first landmark comprises the  
2 image point of the pubic symphysis.
- 1           6. A method according to claim 5 in which said second landmark comprises the  
2 midpoint of a line between the image points of the left and right sacroiliac joints.
- 1           7. A method according to claim 4 in which said displacement is normalized  
2 with respect to the separation between a further pair of landmarks.
- 1           8. A method according to claim 7 in which said further pair of landmarks com-  
2 prises the left and right teardrops.
- 1           9. A method of determining the transaxial rotation of a pelvis from a single  
2 fluoroscopic image, comprising
- 3           A. forming a fluoroscopic image of said pelvis in the near AP direction;
- 4           B. defining first and second landmarks of said pelvis on said image, said land-  
5 marks separated from each other in at least an anterior-posterior direction;
- 6           C. determining the axial displacement of said landmarks on said image;
- 7           D. using said displacement as a measure of the transaxial rotation of said pelvis  
8 with respect to the plane of said fluoroscopic image.
- 1           10. A method according to claim 9 in which said first landmark comprises the  
2 image point of the pubic symphysis.
- 1           11. A method according to claim 10 in which said second landmark comprises  
2 the midpoint of a line between the image points of the left and right sacroiliac joints.

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1           12. A method according to claim 11 in which said displacement is normalized  
2   with respect to the separation between a further pair of landmarks.

1           13. A method according to claim 12 in which said further pair of landmarks  
2   comprises the left and right teardrops.

1           14. A method according to claim 12 in which the transaxial rotation is taken as  
2   a function of the relation of said displacement to the corresponding displacements on  
3   the fluoroscopic images of a sample of pelvises taken at known orientation to the  
4   fluoroscopic image plane.

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